

## Local structure of transparent flexible amorphous M-In-ZnO semiconductor

L. S. Son<sup>1</sup>, K. R. Kim<sup>1</sup>, D.-S. Yang<sup>2</sup>, J. C. Lee<sup>3</sup>, N. Sung<sup>4</sup>, J. Lee<sup>4</sup>, and H. J. Kang<sup>1</sup>

<sup>1</sup>충북대학교 물리학과, <sup>2</sup>충북대학교 물리교육학과, <sup>3</sup>삼성 종합기술원, <sup>4</sup>포항가속기 연구소

The impurity doped ZnO has been extensively studied because of its optoelectric properties. GIZO (Ga-In-Zn-O) amorphous oxide semiconductors has been widely used as transparent flexible semiconductor material. Recently, various amorphous transparent semiconductors such as IZO (In-Zn-O), GIZO, and HIZO (Hf-In-Zn-O) were developed. In this work, we examined the local structures of IZO, GIZO, and HIZO. The local coordination structure was investigated by the extended X-ray absorption fine structure. The IZO, GIZO and HIZO thin films were deposited on the glass substrate with thickness of 400nm by the radio frequency sputtering method. The targets were prepared by the mixture of In<sub>2</sub>O<sub>3</sub>, ZnO and HfO<sub>2</sub> powders. The percent ratio of In:Zn in IZO, Ga:In:Zn in GIZO and Hf:In:Zn in HIZO was 45:55, 33:33:33 and 10:35:55, respectively. In this work, we found that IZO, GIZO and HIZO are all amorphous and have a similar local structure. Also, we obtained the bond distances of  $d_{\text{Ga-O}}=1.85 \text{ \AA}$ ,  $d_{\text{Zn-O}}=1.98 \text{ \AA}$ ,  $d_{\text{Hf-O}}=2.08 \text{ \AA}$ ,  $d_{\text{In-O}}=2.13 \text{ \AA}$ .